Alkaloid

From Wikipedia, the free encyclopedia
(Redirected from Alkaloids)

Alkaloids are a group of naturally occurring chemical compounds that contain mostly basic nitrogen atoms. This group also includes some related compounds with neutral[2] and even weakly acidic properties.[3] Also some synthetic compounds of similar structure are attributed to alkaloids.[4] In addition to carbon, hydrogen and nitrogen, alkaloids may also contain oxygen, sulfur and more rarely other elements such as chlorine, bromine, and phosphorus.[5]

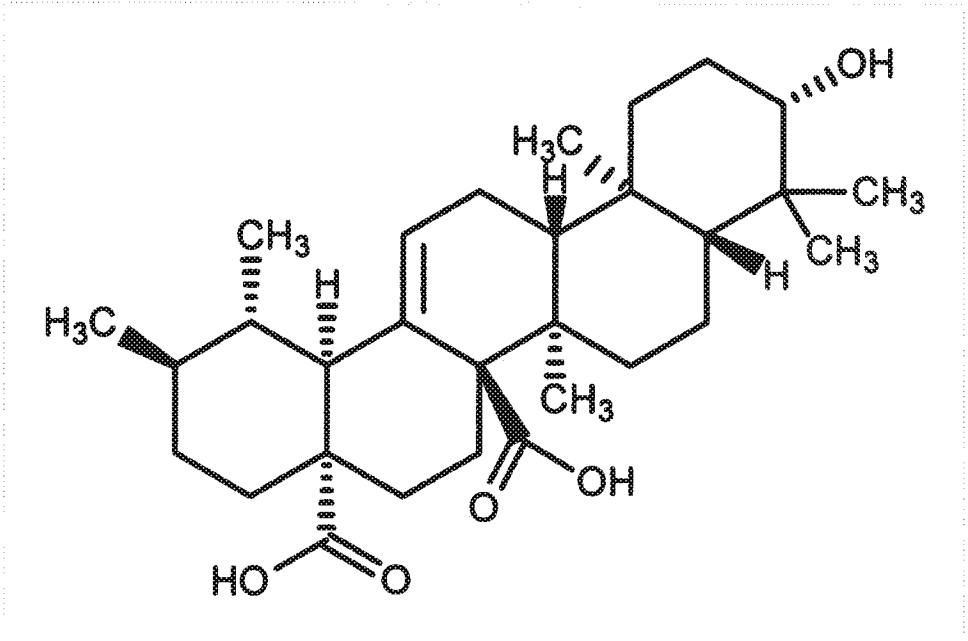
The first individual alkaloid, morphine, was isolated in 1804 from poppy (*Papaver somniferum*).[1]

Alkaloids are produced by a large variety of organisms, including bacteria, fungi, plants, and animals, and are part of the group of natural products (also called secondary metabolites). Many alkaloids can be purified from crude extracts by acid-base extraction. Many alkaloids are toxic to other organisms. They often have pharmacological effects and are used as medications, as recreational drugs, or in entheogenic rituals. Examples are the local anesthetic and stimulant cocaine; the psychedelic psilocin; the stimulant caffeine; nicotine;[6] the analgesic morphine; the antibacterial berberine; the anticancer compound vincristine; the antihypertension agent reserpine; the cholinomimeric galatamine; the spasmolysis agent atropine; the vasodilator vincamine; the anti-arhythmia compound quinidine; the anti-asthma therapeutic ephedrine; and the antimalarial drug quinine. Although alkaloids act on a diversity of metabolic systems in humans and other animals, they almost uniformly invoke a bitter taste.[7]

The boundary between alkaloids and other nitrogen-containing natural compounds is not clear-cut.[8] Compounds like amino acid peptides, proteins, nucleotides, nucleic acid, amines, and antibiotics are usually not called alkaloids.[2] Natural compounds containing nitrogen in the exocyclic position (mescaline, serotonin, dopamine, etc.) are usually attributed to amines rather than alkaloids.[9] Some authors, however, consider alkaloids a special case of amines.[10][11][12]

Gallery Index: Chemical Structures
Starting with the Letter Q

Quinovic Acid Chemical Structure



This is the chemical structure of quinovic acid.

Todd Helmenstine

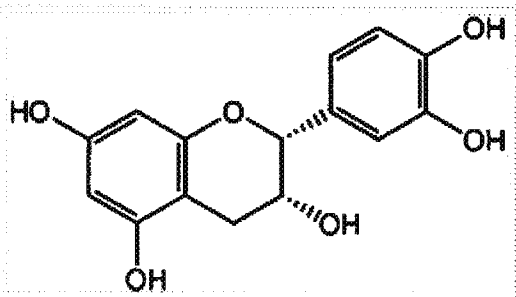
The molecular formula for quinovic acid is $C_{30}H_{46}O_5$.

Related Searches Molecular Formula

Proanthocyanidin

From Wikipedia, the free encyclopedia

Proanthocyanidins, refer to a larger class of polyphenols, called flavanols, in which occur PCOs (proanthocyanidin oligomers) or OPCs (oligomeric proanthocyanidins), the simplest flavanols. More complex polyphenols, having the same polymeric building block, form the group of tannins. Flavanols are distinguished at the core molecule by the hydroxyl group as opposed to the ketone near same position on the pyran ring in the generally yellow class of flavonoids. Colorless PCOs or OPCs are a strictly defined group of 3 flavanols naturally occurring as a mix of monomers, di-mers, and tri-mers of the catechin building block, which is a 4x-hydroxylation of the flavan-3-ol core.



Epicatechin (EC), one of the building blocks of *proanthocyanidins*

PCOs or OPCs were discovered in 1947 by Prof. Jacques Masquelier, who developed and patented techniques for the extraction of oligomeric proanthocyanidins from pine bark and grape seeds.[1]

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Triterpene

From Wikipedia, the free encyclopedia

Triterpenes are terpenes consisting of six isoprene units and have the molecular formula $C_{30}H_{48}$.

The pentacyclic triterpenes can be classified into lupane, oleanane or ursane groups.[1]

A notable pentacyclic triterpene is Boswellic acid.

Animal- and plant-derived triterpenes exist, such as:

- squalene
- ambrein (a tricyclic triterpene alcohol)
- ganoderic acid (quad cyclic)

Triterpenoids are thought of as modified triterpenes, such as lanosterol.

Terpene

From Wikipedia, the free encyclopedia

Terpenes (/ˈtɜrpiːn/ *TUR-peen*) are a large and diverse class of organic compounds, produced by a variety of plants, particularly conifers,[1] though also by some insects such as termites or swallowtail butterflies, which emit terpenes from their osmeteria. They are often strong smelling and thus may have had a protective function.

Many terpenes are derived commercially from conifer resins, such as those made by this pine.

They are the major components of resin, and of turpentine produced from resin. The name "terpene" is derived from the word "turpentine". In addition to their roles as end-products in many organisms, terpenes are major biosynthetic building blocks within nearly every living creature. Steroids, for example, are derivatives of the triterpene squalene.

When terpenes are modified chemically, such as by oxidation or rearrangement of the carbon skeleton, the resulting compounds are generally referred to as terpenoids. Some authors will use the term terpene to include all terpenoids. Terpenoids are also known as isoprenoids.

Terpenes and terpenoids are the primary constituents of the essential oils of many types of plants and flowers. Essential oils are used widely as natural flavor additives for food, as fragrances in perfumery, and in traditional and alternative medicines such as aromatherapy. Synthetic variations and derivatives of natural terpenes and terpenoids also greatly expand the variety of aromas used in perfumery and flavors used in food additives. Vitamin A is an example of a terpene.

Terpenes are released by trees more actively in warmer weather, acting as a natural form of cloud seeding. The clouds reflect sunlight, allowing the forest to regulate its temperature.[2]

The aroma and flavor of hops, highly desirable in some beers, comes from terpenes. Of the terpenes in hops myrcene, b-pinene, b-caryophyllene, and a-humulene are found in the largest quantities.[3]

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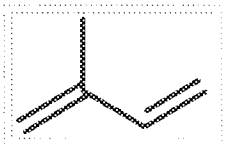
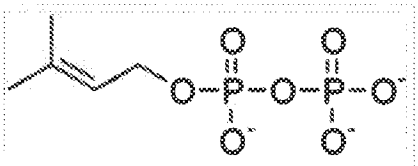
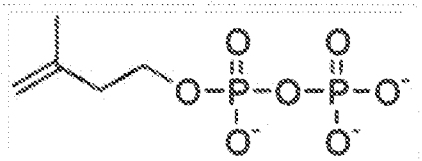
Structure and biosynthesis

Terpenes are derived biosynthetically from units of isoprene, which has the molecular formula C_5H_8. The basic molecular formulae of terpenes are multiples of that, $(C_5H_8)_n$ where n is the number of linked isoprene units. This is called the **isoprene rule** or the *C5 rule*. The isoprene units may be linked together "head to tail" to form linear chains or they may be arranged to form rings. One can consider the isoprene unit as one of nature's common building blocks.


Isoprene

Isoprene itself does not undergo the building process, but rather activated forms, isopentenyl pyrophosphate (IPP or also isopentenyl diphosphate) and dimethylallyl pyrophosphate (DMAPP or also dimethylallyl diphosphate), are the components in the biosynthetic pathway. IPP is formed from acetyl-CoA via the intermediacy of mevalonic acid in the HMG-CoA reductase pathway. An alternative, totally unrelated biosynthesis pathway of IPP is known in some bacterial groups and the plastids of plants, the so-called MEP(2-Methyl-D-erythritol-4-phosphate)-pathway, which is initiated from C5-sugars. In both pathways, IPP is isomerized to DMAPP by the enzyme isopentenyl pyrophosphate isomerase.


Dimethylallyl pyrophosphate


Isopentenyl pyrophosphate

As chains of isoprene units are built up, the resulting terpenes are classified sequentially by size as hemiterpenes, monoterpenes, sesquiterpenes, diterpenes, sesterterpenes, triterpenes, and tetraterpenes. Essentially, they are all synthesised by Terpene synthase.

Sterol

From Wikipedia, the free encyclopedia

Sterols, also known as steroid alcohols, are a subgroup of the steroids and an important class of organic molecules. They occur naturally in plants, animals, and fungi, with the most familiar type of animal sterol being cholesterol. Cholesterol is vital to cellular function, and a precursor to fat-soluble vitamins and steroid hormones.

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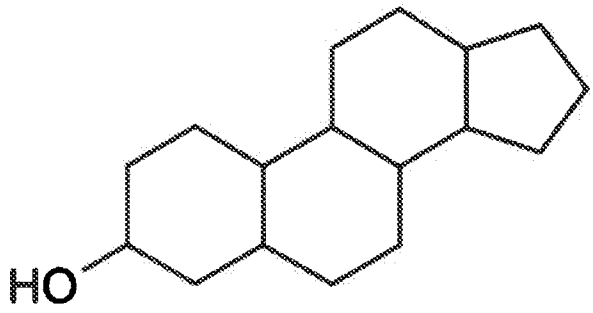

Sterol chemical structure.

Types of sterols

Sterols of plants are called *phytosterols* and sterols of animals are called *zoosterols*. Important zoosterols are cholesterol; notable phytosterols include campesterol, sitosterol, and stigmasterol. Ergosterol is a sterol present in the cell membrane of fungi, where it serves a role similar to cholesterol in animal cells.